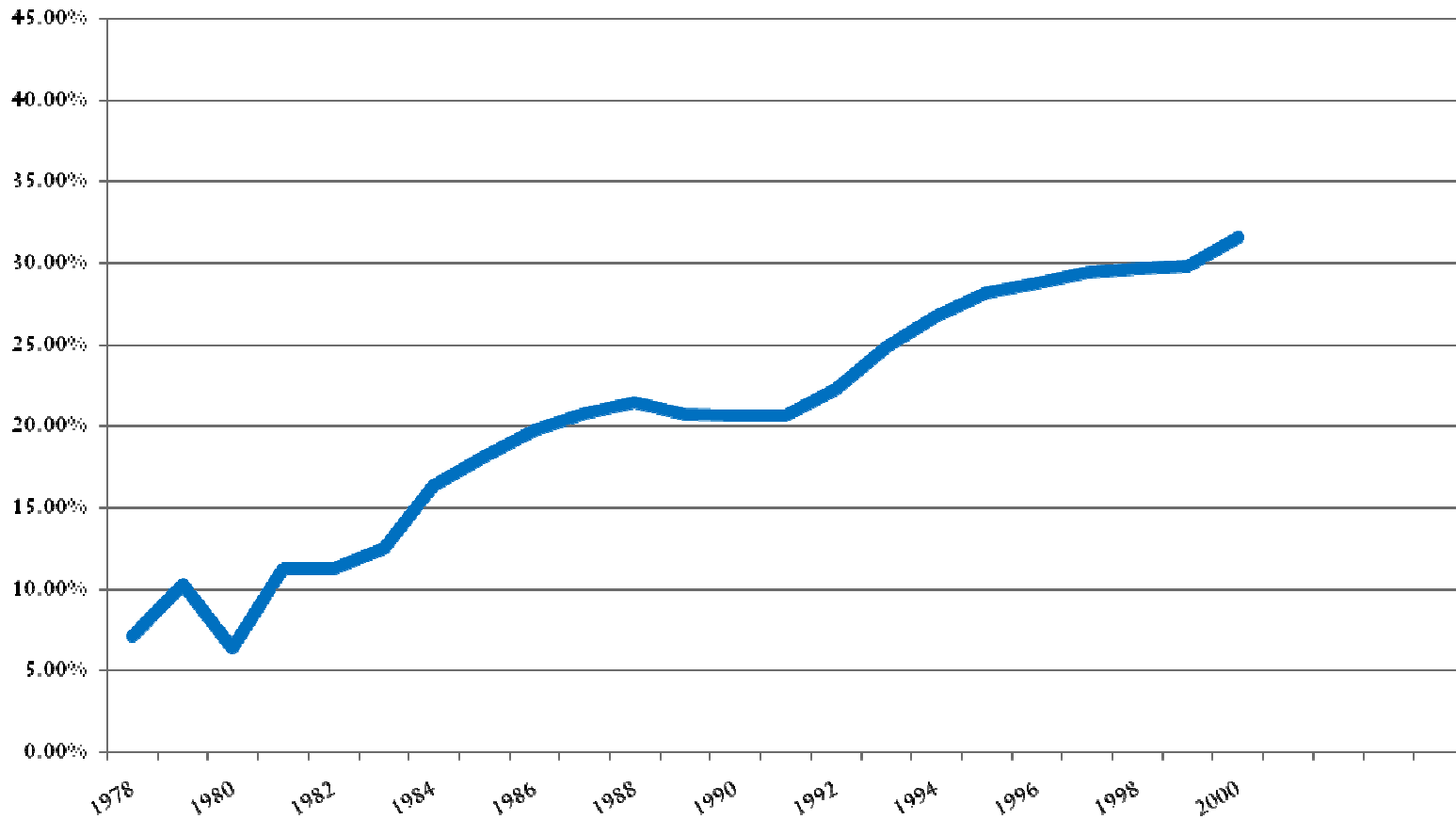# Off-Farm Employment and Educational Attainment in Rural China

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Background

- Increased Off-Farm Employment

Source: China SSB

Background

- Rising Internal Labor Migration
  - 1995: 54 Million (Rozelle et al., 1999)
  - 1996: 68 Million (Liang, 2001)
  - 2005: >100 Million (Omelaniuk, 2005)

- Fastest Growing Component of Off-Farm Employment (de Brauw et al., 2002)

Background

- Higher Enrollment/Literacy Rates in Rural Areas
  - Persistent Rural/Urban Education Gap (Connelly and Zheng, 2003; Zhang and Kanbur, 2003)

- Possible link to increased incidence of migration (De Brauw and Giles, 2006)

Questions

- How is human capital rewarded in the each of three rural sectors: Migration, TVE Employment, and Household Farming?

- How has increased access to off-farm employment opportunities affected educational attainment in rural areas?

Data

- China Household Income Project (CHIP), 1995 Rural Sample.

  - 7,998 Households, 34,739 Individuals

  - 19 Provinces, 112 Counties

Preliminary Evidence
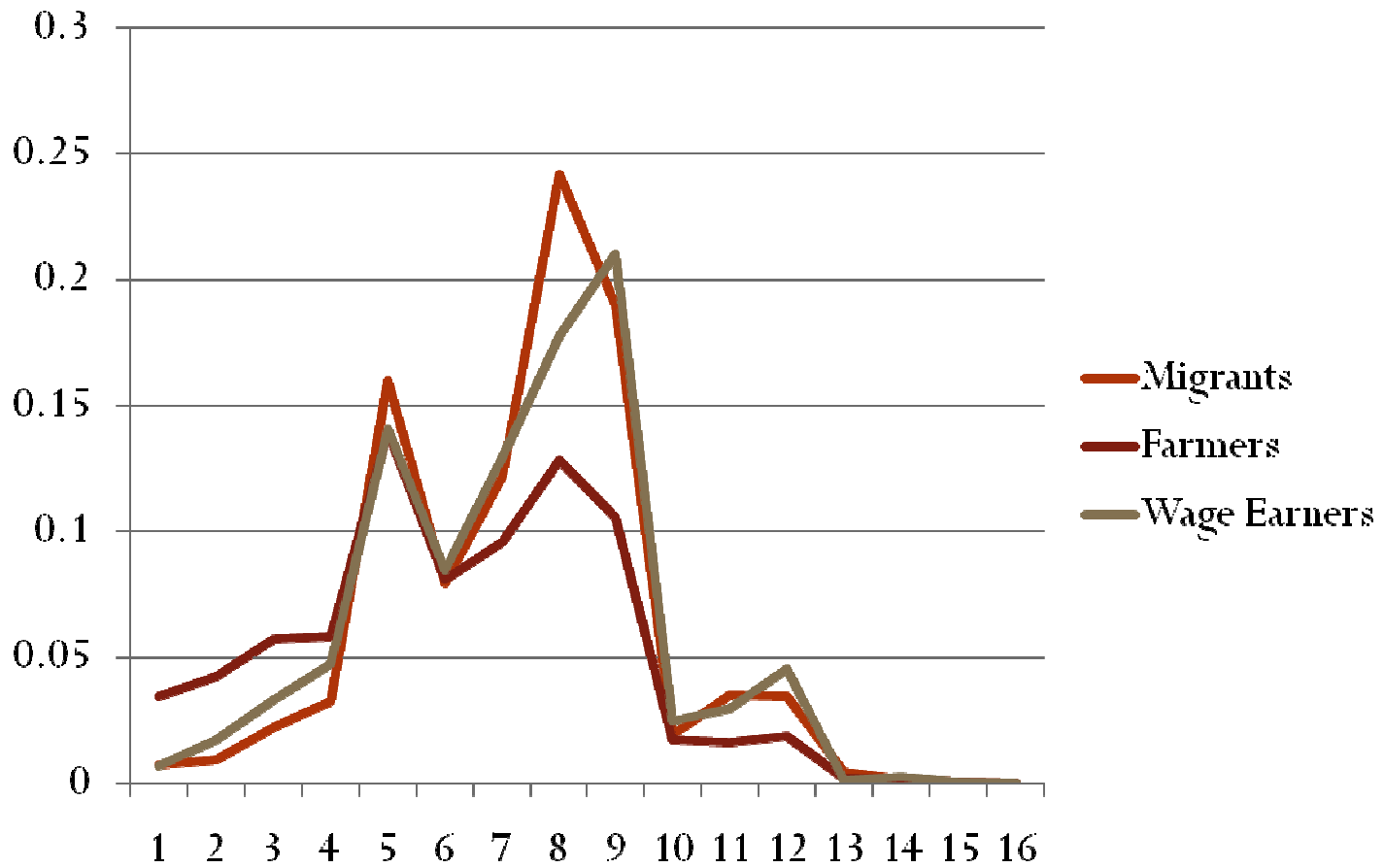
Preliminary Evidence

Province Level Correlation

	Average Years of Schooling	College/Professional Students	Coll/Prof/Technical Students
Migrant % LLF	-0.37	-0.455	-0.40
LL % LLF	0.81	0.52	0.80

County Level Correlation

	Average Years of Schooling	College/Professional Students	Coll/Prof/Technical Students
Migrant % LLF	-0.12	-0.15	-0.17
LL % LLF	0.42	0.05	0.36

Household Time Allocation

- Household heads are uncertain as to how a child's labor time will be allocated in the future

$$E[w_{c,t}] = E[T_{f,t}] \cdot w_t^F(H_t \alpha_F, \mathbf{Z}_F) + E[T_{l,t}] \cdot w_t^l(H_t \alpha_l, \mathbf{Z}_l) + E[T_{M,t}] \cdot w_t^M(H_t \alpha_M, \mathbf{Z}_M)$$

Household Time Allocation

- Positive returns to human capital in a given sector are not sufficient to promote higher levels of educational attainment

- Returns must be high enough to offset the opportunity cost of time spent in education

Analysis

- The empirical analysis consists of two sections:

  1. Derive the returns to education in Household Farming, Migrant Labor, TVE Employment

  2. Determine how potential employment in each sector affects educational attainment.

Analysis - Part One

- Farm income is estimated using a simple value-added function.

- Income from migrant labor and local wage earning will be modeled using Mincer-type income equations.

Farm Income

- Farm income is estimated using a two-stage value added equation:

1)
$$\ln(V) = \alpha + \psi_1 FarmDays + \psi_2 AvgSchYrs + \psi_3 Land$$
$$+ \psi_4 FlatLand + \psi_5 K_F + \psi_6 PctLandIrr + \varsigma_1 Impov + \varepsilon,$$

2)
$$FarmDays = \alpha + \phi_1 AvgSchYrs + \phi_2 Land + \phi_3 FlatLand + \phi_4 K_F$$
$$+ \phi_5 Workers + \phi_6 PartyinHH + \phi_7 PctLandIrr + \varsigma_1 Impov + \varsigma_3 MigPctLF$$
$$+ \varsigma_4 LWEPctLF + \varepsilon.$$

Farm Income

- Days allocated to farming may be endogenously determined.

- Time allocated to farming is instrumented using:
  - Total household labor force (*HHWorkers*)
  - Proportion of the local labor force participating in the local wage earning market (*LLPctLF*)
  - Proportion of the local labor force reporting migrant labor force participation (*MigrantPctLF*)

Results

	DV = ln(V)	DV = FarmDays
FarmDays	0.0009 (16.33)**	
AvgSchYrs	0.005 (2.10)*	-0.54 (-0.64)
Land	0.03 (22.42)**	3.22 (8.03)**
LandPctIrr	0.08 (5.48)**	16.49 (3.64)**
FlatLand	0.16 (11.26)**	17.83 (3.83)**
K_F	0.003 (9.40)**	0.45 (4.43)**
Impov	-0.20 (-11.63)**	43.04 (7.91)**
Workers		95.22 (53.18)**
PartyinHH		-11.93 (-2.23)*
MigPctLF		.05 (0.14)
LWEPctLF		-3.74 (-18.18)**
Adj r^2	0.27	0.41

Farm Income

- Main Findings:
  - Low return to average household level of education (0.5%)

  - Farming Seems to be an Occupation of Last Resort
    - Greater local off-farm employment opportunities reduce time allocated to farming.
    - More time is allocated to farming in impoverished counties

Local Wage Earning

- Income for local wage earning and migrant labor will be estimated using a Mincer-type income equation

- The Heckman two-step method is used to control for selection bias
  - Step 1: Estimate a probit for local wage participation.
  - Step 2: Estimate income equation using the Inverse Mill's Ratio (IMR) calculated from the probit results
  - Tobit estimation results are included to show how each variable used in the probit function affects variation in time allocation rather than likelihood of participation

Local Wage Earning

- Estimated income equation:

1. $$Z = \alpha + \beta_1 SchYrs + \beta_2 Female + \gamma_1 PartyinHH + \gamma_2 LandPerCap + \gamma_3 FlatLand$$
$$+ \gamma_4 K_F PerCap + \delta_1 Impov + \delta_2 MigPctLF + \delta_3 LWEPctLF + \varepsilon.$$

2. $$\ln(DW) = \alpha + \tau_1 SchYrs + \tau_2 Exp + \tau_3 Exp^2 + \tau_4 Female + \omega_1 \lambda + \varepsilon.$$

Results

	Local Wage Earning		
	DV=ln(DW)	Probit	Tobit
SchYrs	0.02 (2.05)*	0.001 (3.88)**	9.63 (4.15)**
Exp	0.06 (4.73)**		
Exp2	-0.002 (-4.13)**		
Female	-0.05 (0.69)	-0.03 (-13.62)**	-196.55 (-12.69)**
PartyinHH	-0.19 (-2.71)**	0.009 (3.90)**	63.04 (3.93)
LandPerCap		-0.002 (-2.74)**	-22.24 (-3.49)**
FlatLand		0.003 (1.76)+	34.05 (2.05)*
$K_F PerCap$		-.000008 (-3.13)+	-0.06 (-3.23)**
Impov		0.001 (0.41)	-4.88 (-0.21)
MigPctLF		0.0003 (1.80)+	1.87 (1.31)
LWEPctLF		0.002 (21.95)**	12.05 (19.73)**
IMR	-0.41 (-5.39)**		
		P> chi^2 = 0	Psuedo R^2=.10

Local Wage Earning

- Main Findings:
  - Positive returns to education:
    - Income (2%)
    - Participation

  - Females are less likely to participate

  - Evidence of selection bias in the sample

Migrant Labor

- Migrant earnings are not directly observed in the data set
  - Estimate migrant contribution to household income via remittance instead

- Imperfect substitute for migrant earnings
  - Must assume that individuals of equal education levels remit equal proportions of their income

Migrant Labor

- Migrant earnings are modeled using an income equation similar to the local wage earning model:

1. $DR = \alpha + \tau_1 SchYrs + \tau_2 Exp + \tau_3 Exp^2 + \tau_4 Female + \omega_1 \lambda + \varepsilon.$

2. $Z = \alpha + \beta_1 SchYrs + \beta_2 Female + \gamma_1 PartyinHH + \gamma_2 LandPerCap + \gamma_3 FlatLand + \gamma_4 K_F PerCap + \delta_1 Impov + \delta_2 MigPctLF + \delta_3 LWEPctLF + \varepsilon.$

Results

| | Migrant Labor | | |
	DV = DR	Probit	Tobit
SchYrs	-0.20 (-2.36)*	0.01 (16.09)**	25.03 (16.33)**
Exp	-0.07 (-0.51)		
Exp2	0.007 (0.98)		
Female	-0.55 (-1.05)	-0.06 (-17.50)**	-145.88 (-15.86)**
PartyinHH		-0.006 (-1.33)	-4.58 (-0.41)
LandPerCap		-0.003 (-2.00)*	-8.22 (-2.19)**
FlatLand		-0.008 (1.95)+	-19.94 (-1.96)*
$K_F PerCap$		-.000004 (-1.15)	-0.01 (1.09)
Impov		0.0007 (0.16)	-1.07 (-0.10)
MigPctLF		0.006 (21.90)**	15.66 (21.05)**
LWEPctLF		-0.001 (-3.00)**	-1.35 (-2.60)**
IMR	-3.63 (4.75)**		
		$P > chi^2 = 0$	Psuedo R^2=.05

Migrant Labor

- Main Findings:
  - Migrants with higher education levels remit less income, but higher education levels increase the probability of migration

  - Females are less likely to migrate

  - Individuals reporting more land per household member spend less time migrating

  - Larger local migrant networks increase the probability of migration while a larger local wage sector discourages migration

Overall Results

- Both migration and TVE employment were positively related to education

- Migrant labor showed negative returns to household income via remittance, but the effect on migrant income is unclear

- The returns to education are higher in TVE employment than in household farming

Education

- The results indicate positive returns to education in both off-farm sectors, but we still do not know if they are high enough to encourage investment in education.

- To determine whether or not these returns are sufficient to encourage investment in education, we model educational attainment directly

Education

- To determine the effect of different employment opportunities on educational attainment, we use a Cox proportional hazards model

- $h(t)$ represents the hazard of any individual i dropping out of school at time t:

$$h_i(t) = h_0(t)\exp(\boldsymbol{\beta}\mathbf{V})$$

Results

	(1)	(2)
	Years 1-12	Years 5-10
Impov	0.977	0.983
	(-0.31)	(-0.20)
NetHHInc	1.000	1.00
	(-0.92)	(-0.13)
AvgPrntSch	0.906	0.915
	(-8.87)**	(-7.30)+
$K_F PerCapita$	1.000	1.000
	(2.18)*	(1.54)
LandPerCapita	1.006	1.035
	(0.25)	(1.44)
LandPcntIrr	0.980	0.988
	(-1.29)	(-0.67)
FlatLand	1.07	1.136
	(1.11)	(1.91)+
MigPctLF	1.018	1.024
	(3.55)**	(4.58)**
PartyinHH	0.840	0.87
	(-2.51)*	(-1.81)+
LWEPctLF	0.997	0.998
	(-0.87)	(-0.50)
Female	1.32	1.287
	(5.42)**	(4.56)**
	$P>chi^2 = 0.00$	$P>chi^2 = 0.00$

Education

- Main Findings:

    - A larger local migrant labor force increases the risk of dropping out of school

    - Females are more likely to drop out of school

    - Higher levels of parental schooling reduce the risk of dropping out

    - Party membership reduces the risk of dropping out

Conclusions

- Migrant labor rewards human capital but not as well as local wage employment.

- Migration may help raise household incomes in the short-run, but promoting the development of rural industries may be more beneficial for long-term growth
  - Human capital externalities

Future Work

- Experiment with different measurements of human capital

- Incorporate risk as an element of household income maximization

- Use panel data set to relax assumptions forced on the proportional hazards model